IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant:	Dale K. Bell
Serial No.:	09/981,238
Filed:	October 17, 2001
Group Art Unit:	3682
Examiner:	Julie Knecht Smith
Title:	AXLE LUBRICANT ISOLATION

APPEAL BRIEF-REVISED

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Pursuant to the Examiner's remarks in the Notice of Non-Compliant Appeal Brief, mailed on December 20, 2006, Applicant is resubmitting herewith the enclosed Appeal Brief-Revised. The Board rejected the Brief for failing to include an Evidence Appendix and Related Proceedings Appendix, which are now appended to this revised brief. Applicant has previously paid the appeal brief fee, therefore requiring no further fees. However, if any further fees are necessary, you are hereby authorized to charge Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds, PC.

REAL PARTY IN INTEREST

The real party in interest is Meritor Heavy Vehicle Technology, LLC. Meritor Heavy Vehicle Technology, LLC is the Assignee of all right and title in this Application from the inventor.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF CLAIMS

Claims 1-8, 10-11 and 14 are presently pending in the application; all of the claims stand finally rejected. Appellant is appealing the rejections of all of the finally rejected claims. Claims 9, 12 and 13 were previously cancelled.

STATUS OF AMENDMENTS

The claims have not been amended subsequent to the final rejection, and therefore, there are no outstanding amendments.

SUMMARY OF CLAIMED SUBJECT MATTER

Referring to paragraph 10 on page 3 of the Specification, a tandem axle system 10 is schematically shown in Figure 1. The tandem axle system 10 includes a front drive axle 11 having an input shaft 13 receiving rotational drive from a drive shaft 12 that is coupled to a transmission. The front drive axle 11 includes a through shaft 14 to transmit rotational drive from the front drive axle 11 to a rear drive axle 15. In this manner, both the front 11 and rear 15 drive axles receive rotational drive from the vehicle transmission. The rear drive axle 15 includes a pinion shaft 17 that receives rotational drive from a drive shaft 16 coupled to the through shaft 14 and pinion shaft 17. The input shaft 13, through shaft 14, and pinion shaft 17 are typically supported in the axle housing by a bearing cage having a bearing assembly supporting the shaft that is secured to the main portion of the axle housing to facilitate assembly of the drive axle.

Claims 3-5 separately claim each of the pinion bearing cage, through shaft bearing cage and

input bearing cage, respectively. The different shafts are illustrated in Figure, shown below.

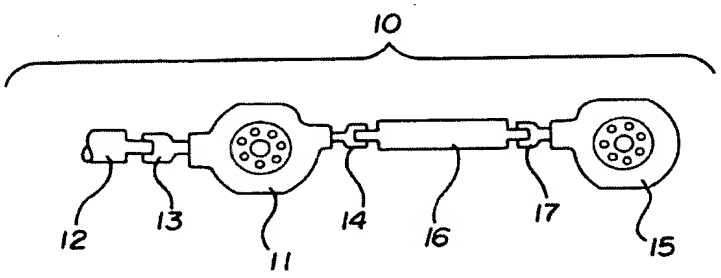
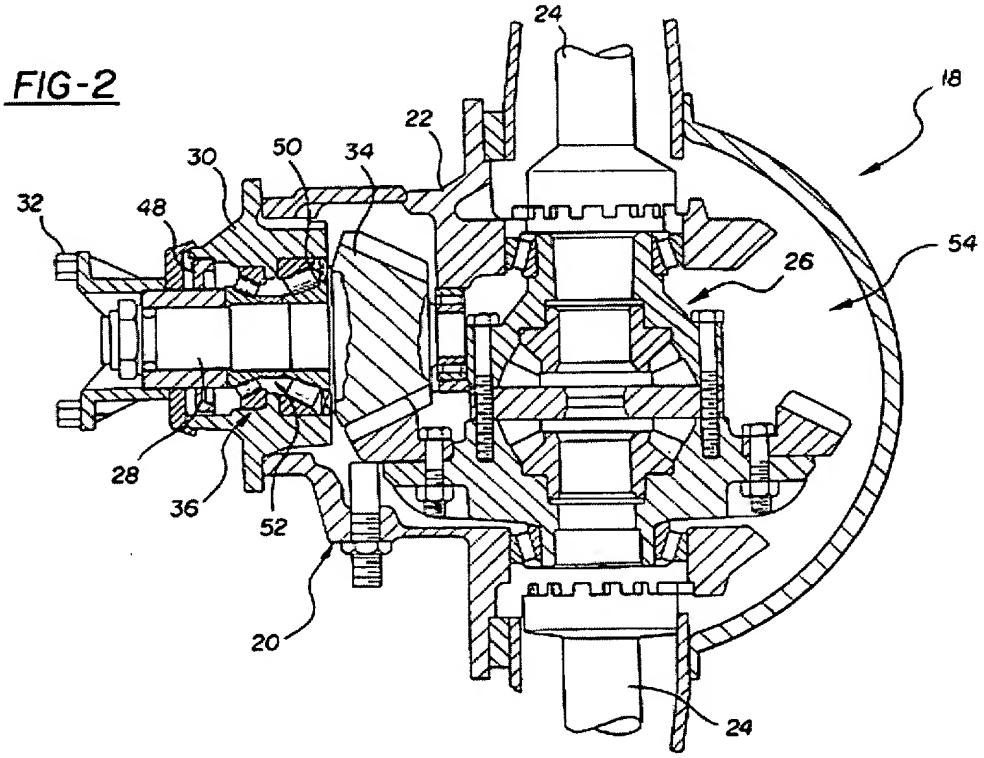


FIG-1

Referring to paragraph 11 on page 3 and to Figure 2, a drive axle assembly 18 is shown which corresponds to the rear drive axle 15 in the tandem axle system 10 shown in Figure 1. However, it is to be understood that while the present invention is discussed in terms of a rear drive axle 15 having a pinion shaft 17, the present invention may also be used for front drive axle arrangements in a tandem axle system for either the input shaft or through shaft.

FIG-2



The drive axle assembly 18 includes an axle housing 20, which may include a main housing portion 22 and a bearing cage 30 secured in some arrangements, the bearing cage may be integral with the housing 22. This invention may be applied there as well. As recited in claim 2, co-axial axle shafts 24 are supported by the main housing portion 22 and are coupled by a differential 26 in a central portion of the housing 20 for relative rotation. A driven shaft 28 is supported within the bearing cage 30 by bearing assembly 36. The driven shaft 28 may refer to an input shaft 13, a through shaft 14, or a pinion shaft 17. The driven shaft 28, which is a pinion shaft as shown in Figure 2, includes a yoke 32 at one end that is coupled to a drive shaft. A pinion 34 is arranged opposite the yoke 32 on the driven shaft 28 and is coupled to the differential 26. For a through shaft in a front drive axle, the driven shaft 28 may include a feature other than the pinion 34.

Referring to Figures 2 and 3 and to paragraph 12 on page 4 of the Specification, the bearing assembly 36 may include first 38 and second 40 tapered roller bearings, as recited in claims 7 and 11. Each bearing includes a cone 42 secured to the driven shaft 28 and a cup 44 secured to the bearing cage 30. Rolling elements 46 are arranged between the cone 42 and cup 44. While a pair of tapered roller bearings are shown, other bearing arrangements may be used. For example, a unitized bearing assembly may be used to support the driven shaft 28 within the bearing cage 30. Unitized bearings typically include a single or common cup and a pair of cones that are secured to one another in a central region of the unitized bearing. Unitized bearings also typically include a seal between each cone and the cup at the outside of the unitized bearing to prevent ingress or egress of lubricant to and from the unitized bearing.

Referring to paragraph 13 on page 5 of the Specification, a seal 48 is typically arranged between the driven shaft 28 and the bearing 30 adjacent to the yoke 32 to prevent debris from entering the drive axle, as recited in claims 10 and 11. As recited in claims 1, 6, 11 and 14, the

present invention incorporates another seal 50 between the driven shaft 28 and bearing cage 30 adjacent to the bearing assembly 36 opposite the seal 48. The seal 50 divides the axle housing 20 into first 52 and second 54 cavities. The first cavity 52 contains the bearing assembly 36, and the second cavity 54 contains the differential 26, ring gear, and pinion 34. In this manner, lubricant containing GL5 additive may be used in the second cavity 54 and prevented from entering the first cavity 52 where it may corrode the bearing assembly 36, as recited in claim 8. Moreover, the amount of lubricant containing GL5 additive may be reduced thereby reducing the potential environmental hazard and churning losses within the drive axle, which may increase drive axle efficiency. A lubricant more suitable for use with bearings without a GL5 or similar additive may be used in the first cavity 52 to lubricate the bearing assembly 36.

Referring to paragraph 14 on page 5, the cone 40 may be extended to support the seal 50 between the cone 40 and the bearing cage 30. Any suitable seal 50 may be used, which may depend upon the particular application, such as whether the bearing cage is used with an input shaft, a through shaft, or a pinion shaft.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-7, 10, 11 and 14 were rejected under §103 over Glaze in view of Miller.

Claim 8 was rejected under §103 over Glaze in view of Miller in further view of Tersigni.

ARGUMENTS

I. Claim 1 is allowable over Glaze in view of Miller

Claim 1 was rejected under §103 over Glaze in view of Miller. Glaze fails to teach the seal arrangement in independent claims 1 and 11. Glaze is directed to a bearing arrangement that is configured to facilitate bearing assembly insertion for the differential. There is no mention of

different lubricants or providing separate lubrication chambers. There is no discussion about the driven shaft in Glaze or any special lubrication concerns relating to its bearings. Why, then, would one of ordinary skill be motivated to modify Glaze? The Examiner provides a motivation of providing "a bearing sealed on both ends so as to divide the assembly into two chambers, each having a different lubricant, and prevent the lubricants from entering adjacent chambers." Again, separate chambers do not exist in Glaze.

The Examiner apparently misunderstands the teachings of Glaze. In the Examiner's January 25, 2005 Response to Arguments (paragraph 4), the Examiner cites column 1, lines 13-28 in support of teaching separate chambers. This portion of Glaze refers to tandem axles generally and also serves as the background art to Glaze. Specific structural relationships between components cannot be ascertained from this general reference. Further, a tandem axle arrangement does not meet the claim language at least with respect to the first seal, the gear assembly and the different lubricants. Moreover, the same lubricant would be used in each axle of the tandem axle arrangement. The present invention claims two lubricants that have compositions that are different from one another.

Miller is directed to providing a sealed cartridge bearing assembly to support the driven shaft. However, Glaze does not use a cartridge bearing design to support its driven shaft. Accordingly, Glaze does not benefit from the Miller seal arrangement. There is no teaching in either reference to motivate one of ordinary skill to modify Glaze. The combination is improper and must be withdrawn. And despite the Examiner's assertion, Miller does not disclose two chambers receiving lubricants of a distinct composition.

II. Claims 3-5 are allowable over Glaze in view of Miller

Claims 3-5 were rejected under §103 over Glaze in view of Miller. Claims 3-5 are also

allowable because the bearing cage in Figure 3 cannot be the three different types of bearing cages claimed. How can one bearing cage in a single Figure be three different things? "Input," "pinion," and "through" shafts are all particular types of arrangement found in axles that may have different bearing arrangements based upon the very different loading they experience. This is explained in paragraph 11 of the specification and shown in Figure 1. While the Examiner is permitted to read the claim language broadly, clearly the Examiner cannot read all the terms to mean the same. Accordingly, the Examiner cannot use a single figure to anticipate what three different configurations, which are well recognized by one of ordinary skill in the art.

With regard to the Examiner's observation that the Appellant shows one bearing cage for all three embodiments: 1) the Appellant's application is irrelevant regarding the Examiner's burden in demonstrating what the prior art teaches; 2) the ends of shaft 28 in Figure 3 are not illustrated because they vary depending upon the application (13, 14, or 17 in Figure 1); if claims 3-5 are all the same then the Examiner should have given a §112 rejection, and if the Examiner does so now she must withdraw the finality of the rejection.

In the Examiner's January 25, 2005 Response to Arguments (paragraph 4), the Examiner states that the Appellant's arguments are moot because claims 3-5 are rejected under a new combination. The Appellant's arguments are applicable independent of the particular references being applied. Here, Miller and Glaze still fail to disclose each of the three different claimed shafts.

III. Claims 6 and 7 are allowable over Glaze in view of Miller

Claims 6 and 7 were rejected under §103 over Glaze in view of Miller. The rejections of claims 6, 7 are also improper because Miller does not disclose the seal arranged between a bearing cage and driven shaft, and specifically, between the bearing cage and cone. The

Examiner has failed to address this argument in any of the prior Office Actions.

IV. Claims 8 is allowable over Glaze in view of Miller and Tersigni

Claim 8 was rejected under §103 over Glaze in view of Miller in further view of Tersigni. Claim 8 recites a GL5 additive. The Examiner argues that the base reference would be modified "to increase efficiency, reduce friction and reduce corrosion of the axle assembly." First, there is nothing in Glaze or Miller that teaches either would benefit from GL5 additive. The Examiner is merely picking and choosing elements from the references to make the combination. Second, GL5 additive had drawbacks associated with its use, which are discussed on the first page of Appellant's specification. Thus, it is just as likely that one of ordinary skill would be motivated to avoid the use of GL5 additive. The Examiner has not established a prima facie case of obviousness 1) since there is no need or benefit taught in any of the references to modify Glaze or Miller to use GL5 additive and 2) since there is reason to avoid using GL5. The combination is improper and the rejection must be withdrawn.

In the Examiner's January 25, 2005 Response to Arguments (paragraph 4), the Examiner relies upon the Appellant's specification for motivation. This is clearly improper because the Appellant's specification is not prior art. The Examiner's claim that Miller teaches that GL5 should not be used in bearings is unfounded. Appellant finds no reference to GL5 anywhere in Miller.

V. Claim 11 is allowable over Glaze in view of Miller

Claim 11 was rejected under §103 over Glaze in view of Miller. Claim 11 is allowable for the reasons argued above relative to claims 1, 6 and 7.

CLOSING

For the reasons set forth above, the final rejection of all claims is improper and must be reversed. An early indication of such is earnestly solicited.

Respectfully submitted,

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Dated: January 10, 2007

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 10 day of January, 2007.

Lindsey C. Fortney

CLAIMS APPENDIX

1. A drive axle assembly comprising:

an axle housing;

coaxial axle shafts supported at least partially within said axle housing;

a driven shaft supported at least partially within said axle housing, and transverse to said coaxial axle shafts;

a gear assembly disposed within said axle housing coupling said coaxial axle shafts and said driven shaft, wherein said gear assembly includes a differential coupling said coaxial axle shafts and said driven shaft to permit relative rotation between said coaxial axle shafts;

a bearing assembly supporting said driven shaft in said axle housing;

a first seal interposed between said driven shaft and said axle housing adjacent to said bearing assembly, said first seal separating said axle housing into first and second cavities with said bearing assembly and said gear assembly respectively disposed therein;

a first lubricant in said first cavity lubricating said bearing assembly; and

a second lubricant of a composition different than said first lubricant in said second cavity lubricating said gear assembly.

2. The drive axle assembly according to claim 1, wherein said axle housing includes a main housing portion supporting said coaxial axle shafts and a bearing cage removably secured to said main housing portion for supporting said driven shaft.

3. The drive axle assembly according to claim 2, wherein said bearing cage is a pinion bearing cage.

4. The drive axle assembly according to claim 2, wherein said bearing cage is a through shaft bearing cage.

5. The drive axle assembly according to claim 2, wherein said bearing cage is an input bearing cage.

6. The drive axle assembly according to claim 2, wherein said first seal is interposed between said bearing cage and said driven shaft.

7. The drive axle assembly according to claim 6, wherein said bearing assembly includes a cup affixed to said bearing cage and a cone affixed to said driven shaft with rolling elements circumferentially located relative to one another by a retainer and arranged between said cup and said cone, said first seal interposed between and in engagement with said bearing cage and said cone.

8. The drive axle assembly according to claim 1, wherein said second lubricant includes a GL5 additive.

10. The drive axle assembly according to claim 14, further including a second seal interposed between said driven shaft and said housing adjacent said bearing assembly opposite said first seal.

11. A drive axle bearing cage assembly comprising:

a bearing cage;

a driven shaft supported by said bearing cage, said driven shaft having a yoke at one end and a pinion at another end opposite said yoke;

a bearing assembly supporting said driven shaft in said bearing cage between said yoke and said pinion, said bearing assembly including at least one cup affixed to said bearing cage and at least one cone affixed to said driven shaft with rolling elements circumferentially located relative to one another by a retainer and arranged between said at least one cup and said at least one cone;

a first seal interposed between said driven shaft and said bearing cage adjacent to said yoke;

a second seal interposed between said driven shaft and said bearing cage adjacent to said pinion; and

wherein said first and second seals are interposed between and in engagement with said bearing cage and said at least one cone.

14. The drive axle assembly according to claim 1, wherein said first seal is interposed between said gear assembly and said bearing assembly.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.